

CLAIMS

1. (Currently amended) A method for filtering image data corresponding to an image that are stored in a plurality of pixels, comprising:

defining a plurality of base directions in terms of which any direction belonging in a plane of the image can be described;

identifying a first one of the pixels that stores image data corresponding to an image edge aligned with an identified one of the base directions;

selecting a directional de-ringing filter having at least one main filter direction perpendicular with the identified base direction; and

applying the selected directional de-ringing filter to the image data of at least a second one of the pixels located adjacent to the identified first pixel, so that the pixel that stores image data corresponding to the image edge is not itself filtered.

2. (Original) The method of claim 1, further comprising:

selecting a plurality of directional edge detection masks, each having a mask direction associated with a respective one of the base directions, and

applying the masks to at least some of the image data to identify the first pixel.

3. (Original) The method of claim 1, further comprising:

computing the edge content in each of the base directions; and
comparing the edge contents of each direction to each other.

4. (Original) The method of claim 3, further comprising:
determining a maximum edge content statistic; and
comparing the determined maximum edge content statistic to a threshold smoothness.

5. (Currently amended) A method for filtering image data corresponding to an image that are stored in a plurality of pixels, comprising:
identifying a first one of the pixels that stores image data corresponding to an image edge that has a preset edge direction;
selecting a directional de-ringing filter having at least one main filter direction perpendicular with the preset edge direction; and
applying the selected directional de-ringing filter to the image data of at least a second one of the pixels located adjacent to the identified first pixel, so that the pixel that stores image data corresponding to the image edge is not itself filtered.

6. (Original) The method of claim 5, further comprising:
selecting a directional edge detection mask having a mask direction associated with the preset direction, and
applying the mask to at least some of the image data to identify the first pixel.

7. (Original) The method of claim 5, further comprising:
identifying a third one of the pixels that stores image data that does not correspond to an image edge that has the preset edge direction, and
applying the selected directional de-ringing filter to the image data of the third pixel.

8. (Currently amended) A method for generating filtered image data ~~corresponding to an image from respective unfiltered image data stored in a plurality of respective pixels, the method comprising: according to claim 20 wherein said determining an associated angle of the detected dominant edge includes:~~

selecting a group of pixels;

selecting a first edge detection mask having a first mask direction; and

convolving the image data of at least some of the selected pixels with the first edge detection mask to detect in a portion of the image corresponding to the group a first edge having a component along the first mask direction[[;]] and

~~if an edge is thus detected, applying to at least one of the selected pixels a directional de-ringing filter having a main direction perpendicular with the first mask direction.~~

9. (Original) The method of claim 8, further comprising:

selecting a second edge detection mask having a second mask direction perpendicular to the first mask direction;

convolving the image data of at least some of the selected pixels with the second edge detection mask to detect in a portion of the image corresponding to the group a second edge having a component along the second mask direction; and

if such a second edge is detected, applying to at least one of the selected pixels a directional de-ringing filter having a main direction associated with the second mask direction.

10. (Original) A method for generating filtered image data corresponding to an image from respective unfiltered image data stored in a plurality of respective pixels, the method comprising:

- selecting a block of pixels;
- convolving the image data of at least some of the selected pixels with a horizontal edge detection mask to measure a horizontal edge content of a horizontal edge in a portion of the image corresponding to the block;
- convolving the image data of at least some of the selected pixels with a vertical edge detection mask to measure a vertical edge content of a vertical edge in a portion of the image corresponding to the block;
- comparing the horizontal edge content to the vertical edge content;
- classifying the portion of the image as containing a horizontal edge if the horizontal edge content is larger than the vertical edge content, else classifying the portion of the image as a vertical edge, if the vertical edge content is larger than the horizontal edge content; and
- if the portion of the image is classified as a containing a horizontal edge, applying a directional de-ringing filter having a vertical main direction to at least a first one of the selected pixels,
- else if the portion of the image is classified as a containing a vertical edge, applying a directional de-ringing filter having a horizontal main direction to at least a second one of the pixels in the block.

11. (Original) The method of claim 10, further comprising:

- determining a maximum edge content statistic, and

wherein the directional de-ringing filter is applied only if the determined maximum edge content statistic is larger than a preset smoothness threshold.

12. (Original) A method for generating filtered image data corresponding to an image from respective unfiltered image data stored in a plurality of respective pixels, the method comprising:
 - identifying a block of pixels containing image data corresponding to an edge having an edge direction;
 - identifying one of the pixels whose unfiltered image data of a pixel, and outputting the unfiltered image data of the pixel as the respective filtered image data;
 - selecting a directional de-ringing filter having a main direction that is perpendicular to the edge direction; and
 - applying the selected directional de-ringing filter to the image data of at least another one of the pixels to generate respective filtered image data.

13. (Original) The method of claim 12, further comprising:
 - determining whether the image data of a pixel corresponds to an edge sharper than a preset threshold.

14. (Original) The method of claim 12, further comprising:
 - identifying at least one direction of interest;
 - selecting a directional edge detection mask having a main direction perpendicular with the direction of interest; and

applying the directional mask to at least some of the image data to identify pixels that store image data corresponding to an image edge having an edge direction perpendicular to the direction of interest.

15. (New) Software code for execution in a processor in connection with compressed image data reconstruction, the software code stored in a machine-readable medium and comprising:
 - first code for selecting a block of pixels of the image data;
 - second code for convolving the image data of at least some of the selected pixels with a horizontal edge detection mask to measure a horizontal edge content of a horizontal edge in a portion of the image corresponding to the block;
 - third code for convolving the image data of said at least some of the selected pixels with a vertical edge detection mask to measure a vertical edge content of a vertical edge in the said portion of the image corresponding to the block;
 - fourth code for comparing the horizontal edge content to the vertical edge content;
 - fifth code for classifying the said portion of the image as containing a horizontal edge if the horizontal edge content is larger than the vertical edge content, else classifying the portion of the image as a vertical edge, if the vertical edge content is larger than the horizontal edge content;
 - sixth code for applying a directional de-ringing filter having a vertical main direction to at least a first one of the selected pixels if the portion of the image is classified as a containing a horizontal edge; and

seventh code for applying a directional de-ringing filter having a horizontal main direction to at least a second one of the pixels in the block if the portion of the image is classified as a containing a vertical edge.

16. (New) Software code stored in a machine-readable medium according to claim 15 wherein the software code is arranged to filter the image data on at least one side of the pixels that contain the edge without filtering the edge pixels themselves, whereby noise is reduced without degrading the edges.

17. (New) Software code stored in a machine-readable medium according to claim 15 wherein the software code is arranged to filter the image data on both sides of the pixels that contain the edge without filtering the edge pixels themselves, whereby noise is reduced without degrading the edges.

18. (New) Software code stored in a machine-readable medium according to claim 15 wherein the block size is selected to contain a single edge.

19. (New) Software code stored in a machine-readable medium according to claim 15 wherein the block size is selected as at least 8 x 8 pixels.

20. (New) A method for generating filtered image data corresponding to an image from respective unfiltered image data stored in a plurality of respective pixels, the method comprising:
selecting a block of pixels;

determining whether a dominant edge can be detected within the block of pixels;
if a dominant edge is detected within the block of pixels, determining an associated angle
of the detected dominant edge; and
if a dominant edge is detected within the block of pixels, applying a directional de-
ringing filter only to selected pixels within the block, wherein the selected pixels are those lying
within the block to either side of the pixels that contain the dominant edge, so that the pixels that
contain the dominant edge are not filtered, and wherein the de-ringing filter has a main direction
perpendicular to the angle of the detected dominant edge.